

REMARKS

Claims 1-44 are currently pending in this application. Claims 1, 2, 7, 8, and 44 have been amended. No new matter has been introduced. Claims 1, 40, 41, 42 43 and 44 are independent claims.

ELECTION/SPECIES

Applicants acknowledge the Examiner's examination of apparatus claims 1-39 and 44 and withdrawal of method claims 40-43.

35 U.S.C. §112 FIRST AND SECOND PARAGRAPH REJECTIONS

Claims 30-39 have been rejected under 35 U.S.C. §112, first and second paragraphs, for failing to adequately support the phrase "edge **bead** electrode". Applicants respectfully traverse these rejections for the following reasons.

Paragraph [0002] of the instate specification clearly defines an edge bead as a "peripheral edge of wafer". Applicants assert that an "edge bead electrode" is any electrode is that is located near a peripheral edge of a wafer. Applicants assert that examples of edge bead electrodes are illustrated in Figures 1, 2, 6, and/or 7. Accordingly, reconsideration and withdrawal of these rejections is respectfully requested.

EXAMPLE EMBODIMENTS

Figure 1 illustrates an example embodiment, which includes an upper electrode 10, a bottom electrode in stage 20, an edge electrode 30, an insulation plate 40, and an RF power line 50. As shown in Figure 1, the bottom electrode 20 supports a wafer 1 while the upper electrode 10 and the edge electrode 30 reciprocally generate plasma at an edge and/or a back side of the wafer 1.

Figure 2 illustrates an example of an upper electrode 10 and an insulation plate 40 in more detail. As illustrated in Figure 2, the insulation plate 40 may include a protrusion 41, and the protrusion 41 has a slope or other contour which guides the processing gas, thereby preventing or substantially preventing a processing gas from flowing onto the center area of the wafer during the etching process.

Figure 3 illustrates the protrusion 41 of Figure 2 in more detail. As shown, the protrusion 41 may include a slope portion 43 and a cliff 45 which forms a gap 44 between the upper electrode 10 and the insulation plate 40.

Figure 6 illustrates another example embodiment including an upper electrode 110, a bottom electrode and stage 120, a first edge electrode 130, a second edge electrode 140, an insulator 150, an RF power supply 160, and a ground terminal 170. As illustrated in Figure 6, the bottom electrode and stage 120 supports a wafer 1 while the upper electrode 110, the first edge electrode 130, and the second edge electrode 140 reciprocally generate plasma at the edge bead and/or back side of the wafer 1. The first edge electrode 130 and/or the second electrode 140 may be doughnut-shaped electrodes.

Figure 7 illustrates another example embodiment. As illustrated in Figure 7, the edge electrode 240 is a ring-type edge electrode, which reciprocally generates plasma at the edge bead and/or a back side of the wafer 1.

35 U.S.C. §102 REJECTIONS

The Examiner has rejected a variety of the independent and dependent claims under 35 U.S.C. §102(b) and (e) using a variety of U.S. patents and patent application publications. Applicants respectfully traverse these rejections for the following reasons.

35 U.S.C. §102(B) KOSHIISHI REJECTION

Claims 1, 2, 7, 12-13 and 44 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 5,919,332 to Koshiishi et al. Applicants respectfully traverse this rejection for the following reasons.

The Examiner asserts that Figure 1 of Koshiishi et al. illustrates a bottom electrode 6, which acts as a stage, a solid upper electrode 21, an insulating plate 31 arranged adjacent to the solid plate upper electrode 21. The Examiner asserts that there is a gap between insulating plate 31 and the solid plate upper electrode 21 and asserts the gap is formed at the junction of the upper electrode 21 and the insulating plate 31.

Applicants assert that there is fundamental difference between the relationship of the upper electrode and the insulating plate of example embodiments and the insulating plate 31 and upper electrode 21 of Koshiishi et al. For example, as illustrated in Figures 2-3, a gap 44 exists between the insulating plate 40 and the upper electrode 10, whereas in Figure 1 of Koshiishi et al., the upper electrode 21 and the insulating plate 31 are in contact with other; as a result, there is no gap or space therebetween.

Applicants respectfully submit that amended independent claim 1 more specifically recites this feature. Accordingly, reconsideration of this rejection and allowance of independent claim 1 is respectfully requested.

Applicants respectfully assert that dependent claims 2, 7, and 12-13 are allowable by virtue of their dependency on allowable independent claim 1. Accordingly, reconsideration of this rejection and allowance of dependent claims 2, 7, and 12-13 is respectfully requested.

With respect to independent claim 44, Applicants assert that this claim has been amended to more specifically recite the protrusion. As recited in independent claim 44, the protrusion protrudes outwardly in a direction parallel to a radial direction of the body. An example is shown in Figures 2-3 of the instant specification.

As is clearly illustrated in Fig. 1 of Koshiishi et al., the insulating plate 31 does not include a protrusion protruding outwardly in a direction parallel to a radial direction of the body of the insulating plate 31. Accordingly, reconsideration of this rejection and allowance of independent claim 44 is respectfully requested.

35 U.S.C. §102(B) FUJIMOTO REJECTION

Claims 1-2, 7, 12-13 and 44 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 5,413,673 to Fujimoto et al. Applicants respectfully traverse this rejection for the following reasons.

The Examiner asserts that Figures 4 and 5 of Fujimoto et al. illustrates a bottom electrode 52, which acts as a stage for semiconductor wafer 50, an upper electrode 51 arranged above the semiconductor wafer, and insulating plates 42 arranged adjacent to the upper electrode 51 with a gap therebetween.

As set forth above with respect to Koshiishi et al, Applicants assert that Fujimoto et al. also fails to teach or suggest a gap or space between an upper electrode and an insulating plate. Fig. 4B of Fujimoto et al. illustrates the upper electrode 51 and the insulating plate 42 are in contact with each other; as a result, there is no gap or space therebetween.

Applicants respectfully submit that amended independent claim 1 more specifically recites this feature. Accordingly, reconsideration of this rejection and allowance of independent claim 1 is respectfully requested.

Applicants respectfully assert that dependent claims 2, 7, and 12-13 are allowable by virtue of their dependency on allowable independent claim 1. Accordingly, reconsideration of this rejection and allowance of dependent claims 2, 7, and 12-13 is respectfully requested.

With respect to independent claim 44, Applicants assert that this claim has been amended to more specifically recite the protrusion. As recited in independent claim 44, the

protrusion protrudes outwardly in a direction parallel to a radial direction of the body. An example is shown in Figures 2-3 of the instant specification.

As is clearly illustrated in Fig. 5B of Fujimoto et al., the insulating plate 42 does not include a protrusion protruding outwardly in a direction parallel to a radial direction of the body of the insulating plate 42. Accordingly, reconsideration of this rejection and allowance of independent claim 44 is respectfully requested.

35 U.S.C. §102(B) QUON REJECTION

Claims 1-8, 19 and 20-21 have been rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication 2003/0150562 to Quon et al. Applicants respectfully traverse this rejection for the following reasons.

Quon et al. discloses a bottom electrode 20 below a semiconductor wafer 14 which acts as a stage. Quon et al. also teaches an upper electrode 10 arranged above the semiconductor wafer and an insulating plate 80 arranged adjacent to the solid upper plate electrode 10. Quon et al. also teaches a ring-type upper electrode 30 above the wafer and a lower electrode 40.

As set forth above with respect to Koshiishi et al, Applicants assert that Quon et al. also fails to teach or suggest a gap or space between an upper electrode and an insulating plate. Fig. 1 of Quon et al. illustrates the upper electrode 10 and the insulating plate 80 are in contact with each other; as a result, there is no gap or space therebetween.

Applicants respectfully submit that amended independent claim 1 more specifically recites this feature. Accordingly, reconsideration of this rejection and allowance of independent claim 1 is respectfully requested.

Applicants respectfully assert that dependent claims 2-8, 19 and 20-21 are allowable by virtue of their dependency on allowable independent claim 1. Accordingly,

reconsideration of this rejection and allowance of dependent claims 2-8, 19 and 20-21 is respectfully requested.

35 U.S.C. §102(E) KIM REJECTION

Claims 1-2, 7 and 12 have been rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication 2003/0070760 to Kim et al. Applicants respectfully traverse this rejection for the following reasons.

The Examiner asserts that Kim et al. teaches a bottom electrode 155 arranged below a semiconductor wafer 154 acting as a stage, a solid upper electrode 151 arranged above the semiconductor wafer 154 and an insulating plate 142 arranged adjacent to the solid plate upper electrode 151 with a gap 153 therebetween.

As set forth above with respect to Koshiishi et al, Applicants assert that Kim et al. also fails to teach or suggest a gap or space between an upper electrode and an insulating plate. Fig. 2B of Kim et al. illustrates the upper electrode 151 and the insulating 152 are in contact with each other; as a result, there is no gap or space therebetween.

Applicants respectfully submit that amended independent claim 1 more specifically recites this feature. Accordingly, reconsideration of this rejection and allowance of independent claim 1 is respectfully requested.

Applicants respectfully assert that dependent claims 2, 7 and 12 are allowable by virtue of their dependency on allowable independent claim 1. Accordingly, reconsideration of this rejection and allowance of dependent claims 2, 7 and 12 is respectfully requested.

35 U.S.C. §102(e) HOUGHTON REJECTION

Claims 1-4, 6 and 17-18 have been rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication 2004/0137745 to Houghton et al. Applicants respectfully traverse this rejection for the following reasons.

Figure 2 of Houghton et al. illustrates a wafer 100, with a wafer edge 115, a wafer chuck 140, and a shield 145. Figure 4 of Houghton et al. further illustrates an electrode 175 and a power source 165.

As set forth above with respect to Koshiishi et al, Applicants assert that Houghton et al. also fails to teach or suggest an upper electrode or an insulating plate, let alone a gap or space between an upper electrode and an insulating plate. Fig. 1 of Houghton et al. illustrates a shield 145, which is not an electrode, and no insulating plate; as a result, there is no gap or space between an upper electrode and an insulating plate.

Applicants respectfully submit that amended independent claim 1 more specifically recites this feature. Accordingly, reconsideration of this rejection and allowance of independent claim 1 is respectfully requested.

Applicants respectfully assert that dependent claims 2-4, 6 and 17-18 are allowable by virtue of their dependency on allowable independent claim 1. Accordingly, reconsideration of this rejection and allowance of dependent claims 2-4, 6 and 17-18 is respectfully requested.

35 U.S.C. §102(e) BERMAN REJECTION

Claim 44 has been rejected under 35 U.S.C §102(e) as being anticipated by U.S. Patent 6,837,967 to Berman. Applicants respectfully traverse this rejection for the following reasons.

Figure 1 of Berman illustrates a top plate 120.

As set forth above with respect to Koshiishi et al, Applicants assert that Berman also fails to teach or suggest a protrusion protruding outwardly in a direction parallel to a radial direction of the body. At best, Fig. 1 of Berman illustrates a protrusion protruding outwardly in a direction perpendicular to a radial direction of the body.

With respect to independent claim 44, Applicants assert that this claim has been amended to more specifically recite the protrusion. As recited in independent claim 44, the protrusion protrudes outwardly in a direction parallel to a radial direction of the body. An example is shown in Figures 2-3 of the instant specification.

As is clearly illustrated in Fig. 1 of Berman illustrates a protrusion protruding outwardly in a direction perpendicular to a radial direction of the body. Accordingly, reconsideration of this rejection and allowance of independent claim 44 is respectfully requested.

35 U.S.C. §103 REJECTIONS

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quon et al., US Patent Application Publication 2003/0150562 A1 in view of Johnson, US Patent 2003/0201069 A1. Claims 5, 7, 8, 10, 11, 19-22, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Houghton et al, US Patent Application Publication 2004/0137745 A1, in view of Quon et al., US Patent Application Publication 2003/0150562 A1. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Houghton et al, US Patent Application Publication 21004/0137745 A1, and Quon et al., US Patent Application Publication 2003/0150562 A1, as applied to claims 5, 7, 8, 10, 11, 19-22, 28, and 29 above, and further in view of Johnson US Patent Application Publication 2003/0201069 A1. Claims 12-16, and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Houghton et al, US Patent Application Publication 2004/0137745 A1, and Quon et al., US Patent Application Publication 2003/0150562 A1, as applied to claims 5, 7, 8, 10, 11, 19-22, 28, and 29 above, and further in view of Koshiishi et al, US Patent 5,919,332.

Applicants respectfully assert that each of these rejections has been overcome by overcoming the various rejections of independent claim 1. Accordingly, reconsideration of this rejection and allowance of each of these dependent claims is respectfully requested.

CONCLUSION

Accordingly, in view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of claims 1-44 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John A. Castellano at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By

John A. Castellano, Reg. No. 35,094

P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

JAC/pw